National Aeronautics and Space Administration

Sounding Rockets Program Office Quarterly Newsletter

Rocket Report

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2025

INSIDE

Cover photo:
Sporadic E Electrodynamics (SEED) rocket on the pad in Kwajalein.
Credit: NASA Photo/Chris Lanier

46.026 UE SEED launch from Kwajalein.
Credit: NASA Photo/Chris Lanier

CTURE OF THE QUARTER

Program News

Two sounding rockets were launched from the Roi Namur, Kwajalein Atoll, Marshall Islands for the Sporadic E Electrodynamics (SEED) investigation. Both flights were successful and good data was received.

The RockOn student payload was launched from Wallops Island, VA. Over 200 university and college students and faculty participated by building experiments for the payload.

Upcoming launches include investigations for Solar Physics, Geospace Science and Student outreach. Solar eruptioN Integral Field Spectrograph (SNIFS) is scheduled for launch from White Sands Missile Range, NM on July 18, 2025. RockSat–X, the most advanced student flight opportunity, is scheduled to launch from Wallops Island, VA on August 12, 2025. The Turbulent Oxygen Mixing Experiment Plus (TOMEXplus) includes three rockets and will be launched from Wallops Island, VA. The launch window opens on August 17, 2025.

Local wildlife in Kwajalein.
Credit: Chris Lanier

46.026 & 46.037 UE Barjatya/Embry-Riddle Aeronautical University- Sporadic E Electrodynamics (SEED)- June 20 & 28, 2025.

Two Terrier–Improved Malemute rockets were launched for the SEED mission from Roi Namur, Kwajalein Atoll, Marshall Islands. First off the pad was 46.026 UE, launched on June 20th. 46.037 UE was launched on June 28th.

Sporadic–E (Es) (90–125km) is a generic term used to describe thin (one to several km) ionization layers that are typically formed in the E region ionosphere. The density within the Es layers is several factors to a few orders of magnitude higher than the background ionosphere and can sometimes get higher than the F–region densities. Despite decades of observations and modeling efforts of Es layers, there is a lack of complete understanding of Es layers and the role they play in E–F region coupling, especially at low latitudes. Degradation of RF communications and operational anomalies/failures during ionospheric disturbances are a crucial space weather influence on modern life. Es layers are the sole ubiquitous space weather source in the ionosphere that produce scintillations during nighttime and daytime, affecting operational RF transmissions such as HF, VHF and UHF communication links, as well as over–the–horizon radar and communications.

The SEED mission aims to do comprehensive measurements of the electrodynamics associated with Es layers observed at the low latitude location of Kwajalein Atoll in the Marshall Islands. In particular, SEED aims to investigate density–temperature anti–correlations. SEED addresses a series of specific but interlinked science questions related to the Es layer phenomena, especially high altitude (>100 km) Es layers, at a low–latitude location (Kwajalein) during solar–min. Progress on these three questions will also contribute to the broader science goal of understanding the role of Es layers in ionosphere coupling.

Two comprehensively instrumented rockets were launched into an Es layer, with each deploying four instrumented sub–payloads. One deployed TMA puff releases. The experiment was supported by ground–based observations from ALTAIR, digisonde, and GPS receivers. Observations will be used to constrain comprehensive modeling during the data analysis phase.

SEED Team with rocket.
Credit: NASA Photo/Chris Lanier

41.134 WO Koehler NASA Wallops Flight Facility - RockOn - June 26, 2025

This payload carried two types of experiments built by college and university students, RockOn workshop experiments and RockSat–C experiments.

The RockOn experiments are built, tested and integrated by students and faculty attending the week long workshop held at Wallops starting on June 20th. Teams of three participants complete experiment construction on a deckplate which is integrated into a canister and then into the payload structure for flight.

A separate RockOn Faculty Workshop provided one canister of experiments for this flight. The faculty members attended a workshop at Wallops Flight Facility in May to construct the experiments.

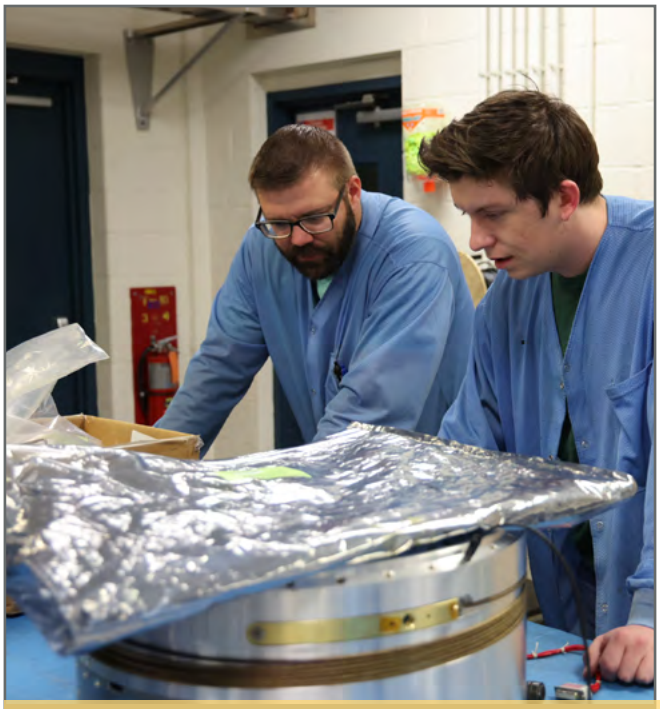
The RockSat–C experiments are more advanced and are built by teams of students prior to arrival at Wallops. Payload support systems are similar to RockOn experiments. This year seven experiments were provided by: Tidewater Community College, Louisiana State University, Temple University, University of Colorado Colorado Springs, University of Hartford, University of Alaska and Stevens Institute of Technology. Additionally the Cubes–in–Space, middle school student experiments, were flown in the nosecone of the rocket.

The rocket was succesfully launched from Wallops Island, VA, and the payload was recovered in the ocean off the coast of Wallops Island.

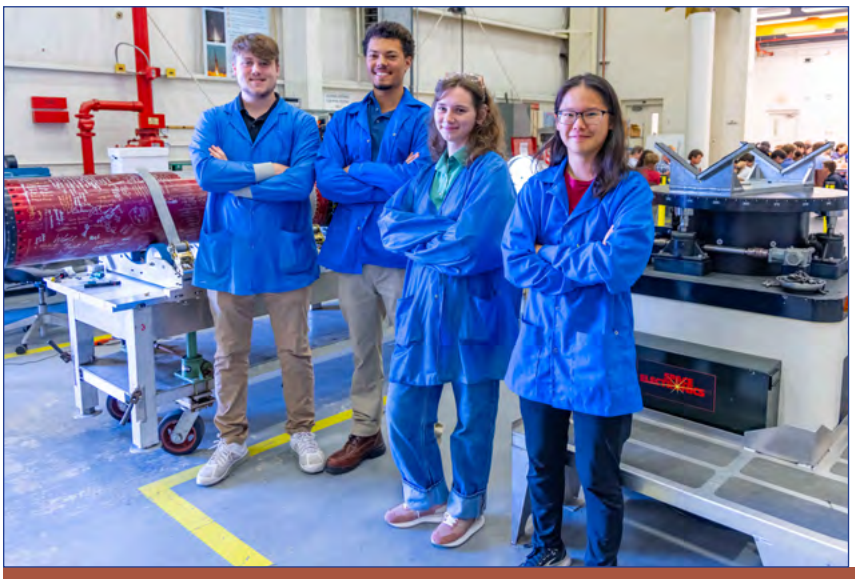
RockOn launches from Wallops Island, VA
Credit: NASA Photo/Berit Bland

Experiments returned to students post flight.
Credit: NASA Photo/Berit Bland

Students on Wallops Island after the launch.
Credit: NASA Photo/Berit Bland



Picture Place



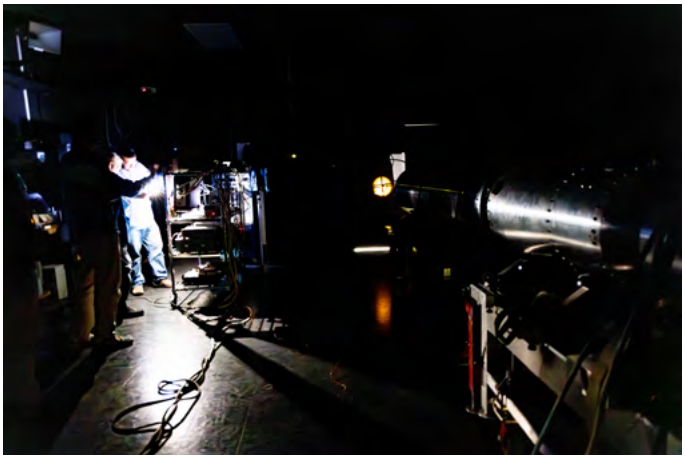
Credit: NASA Photo/Chris Lanier

Integration and Testing

36.335, 41.123 & 41.124 CE Clemmons/Aerospace Corporation - Turbulent Oxygen Mixing Experiment Plus (TOMEXplus)

The Turbulent Oxygen Mixing Experiment Plus (TOMEXplus) sounding rocket investigation explores the three–dimensional nature of turbulent phenomena near the mesopause through a three–rocket salvo combined with ground–based remote–sensing instrumentation and state–of–the–art modeling. The energy cascade spectrum from 15 m to 2 km is covered by the centerpiece of the rocket–borne instrumentation, a sodium lidar system. These measurements are supplemented and complemented by in–situ measurements of atmospheric density, winds, temperature, and composition, and two concurrently–launched vapor trail rockets provide context measurements of winds and atmospheric mixing. A ground–based segment includes a camera that images waves through OH airglow measurements and an iron LiDAR that provides context measurements of the temperature and winds. A modeling component is included to help interpret the measurements returned by the experiment.

The launch window opens on August 17, 2025 at NASA's Wallops Island, VA launch facility.



TOMEX Plus 36.335 laser testing.
Credit: NASA Photo/Berit Bland

46.043 WO Koehler/NASA Wallops Flight Facility - RockSat-X

RockSat–X is the most advance in a series of student flight opportunities. RockSat–X provide access to the space environment, i.e. the payload skirt is deployed and the experiments are exposed to the vacuum and radiation of space. Students design and build their own experiments and the payload includes standard support systems, such as, telemetry, attitude control, and recovery.

Nine Colleges and Universities are flying experiments in 2025 and the launch is currently scheduled for August 12, 2025 from Wallops Island, VA.

RockSat integration at Wallops.
Credit: NASA Photo/Berit Bland

From the Archives
Calibrating solar telescopes on Skylab

Sounding Rocket launches to calibrate telescopes onboard Skylab

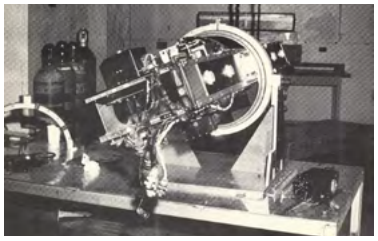
In 1970 the Naval Research Laboratory (NRL), Harvard College Observatory (HCO), American Science and Engineering (AS&E) and others proposed inflight calibration of the Skylab Apollo Telescope Mount (ATM) experiments.

The purpose of the calibration rockets (CALROC) was to obtain solar scientific data for use in calibrating the Skylab ATM S082 (NRL) and S055 (HCO) solar data taken by the respective experiments onboard Skylab during the Skylab mission. To assure an accurate representation of the solar data accumulated by both the S082 and S055 experiments, whose optical systems were fabricated in excess of two years prior to launch, it was necessary to measure the solar phenomenon present by a separate nondegraded system coincident with the Skylab ATM operations. The most practical system available, which satisfied all requirements, was the sounding rocket/payload system.

A total of six Black Brant VC rockets were flown from White Sands Missile Range, NM for the Skylab CALROC project. Three NRL payloads (21.012, 21.013, 21.014) and three HCO payloads (21.021, 21.022, 21.023) were flown between April 3, 1973 and January 15, 1974. Several Black Brant VC flights were conducted before the Skylab portion of the project. These flights demonstrated and verified hardware functionality for the SKYLAB calibrations.

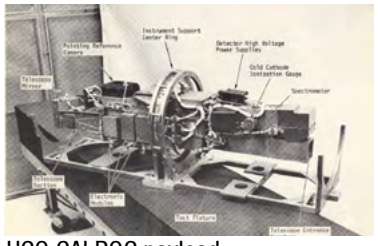
Obtaining the necessary calibration with CALROC to calibrate the Skylab S082 and S055 ATM experiment data required very close coordination between the CALROC launch team and the Skylab mission planners and operations personnel. CALROC launch dates and times were based on the proposed Skylab flight plan. The exact sun area for calibration data gathering was selected jointly by the CALROC and Skylab principal investigators within the last 24 hours prior to a CALROC launch. On the day of a CALROC launch, Skylab mission operations at Johnson Space Center (JSC) was contacted by telephone periodically by the MSFC CALROC representative at WSMR and appraised of the CALROC countdown progress. During the last 15 minutes of countdown the telephone line to Skylab Mission Operations was kept open so that the. JSC flight controllers could hear the actual countdown and firing of the CALROC.

The NRL Scientific Instrument was composed of four photographic camera subsystems and two supporting subsystems. The camera subsystems included a Spectroheliograph which photographed the full sun and a Spectrograph which provided spectrograms throughout the range 2135 to 1200 Å. Both of these systems were 1/2 scale duplicates of the optical systems onboard Skylab. Since the calibration equipment was photographic all scientific data was on film, thus requiring successful and timely recovery.



NRL CALROC payload
Credit: WSMR

The HCO Scientific Instrument was an extreme ultraviolet (EUV) spectroheliometer designed to monitor solar radiation in the wavelength range 1350 Å to 300 Å with a 1.6 Å spectral resolution. The spectroheliometer consisted of three main subsystems; a telescope, spectrometer and pointing reference camera.



HCO CALROC payload
Credit: HCO

Read the full NASA Technical Report

SCHEDULE FOR NEXT QUARTER

MISSION	DISCIPLINE	EXPERIMENTER	ORGANIZATION	PROJECT	RANGE	DATE
36.372 US	SOLAR & HELIOSPHERIC	CHAMBERLIN	UNIV OF COLORADO	SNIFS	WS	07/18/25
46.043 WO	STUDENT OUTREACH	KOEHLER	NASA WFF	ROCKSAT–X	WI	08/12/25
36.335 CE	GEOSPACE SCIENCES	CLEMMONS	AEROSPACE CORP.	TOMEX–Plus	WI	08/17/25
41.123 CE	GEOSPACE SCIENCES	CLEMMONS	AEROSPACE CORP.	TOMEX–Plus	WI	08/17/25
41.124 CE	GEOSPACE SCIENCES	CLEMMONS	AEROSPACE CORP.	TOMEX–Plus	WI	08/17/25

WI – Wallops Island, VA
WS – White Sands Missile Range, NM

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Preparing rocket and payload for launch from Kwajalein,
Credit: NASA Photo/Chris Lanier